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JUL 13 2004
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PTO/SB/21 (02-04)
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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/683,688
Filing Date	October 9, 2003
First Named Inventor	Yasutomo Yamamoto, et al.
Art Unit	2818
Examiner Name	To Be Assigned
Attorney Docket Number	81940.0063

Total Number of Pages in This Submission: 25

ENCLOSURES *(Check all that apply)*

- [✓] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [✓] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Response to Missing Parts/ Incomplete Application
  - [ ] Response to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [✓] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
- [ ] After Allowance communication to Technology Center (TC)
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [✓] Other Enclosure(s) (please Identify below):

Copy of Patentability Search Report dated May 27, 2004

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Ying Chen, Esq. HOGAN & HARTSON L.L.P.
Signature	Ying Chen
Date	July 9, 2004

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Typed or printed name	Kimberly Yee	Date	July 9, 2004
Signature	Kimberly Yee		

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PTO/SB/17 (10-03)
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FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 130.00

Complete if Known	
Application Number	10/683,688
Filing Date	October 9, 2003
First Named Inventor	Yasutomo Yamamoto, et al.
Examiner Name	To Be Assigned
Art Unit	2818
Attorney Docket No.	81940.0063

METHOD OF PAYMENT *(check all that apply)*

☐ Check ☐ Credit card ☐ Money Order ☒ Other ☐ None

☒ Deposit Account:

Deposit Account Number: 50-1314

Deposit Account Name: Hogan & Hartson L.L.P.

The Director is authorized to: *(check all that apply)*

☒ Charge fee(s) indicated below ☐ Credit any overpayments

☒ Charge any additional fee(s) or any underpayment of fee(s)

☐ Charge fee(s) indicated below, **except for the filing fee** to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

		Extra Claims		Fee from below	Fee Paid
Total Claims		-20** =		X	=
Independent Claims		- 3** =		X	=
Multiple Dependent					=

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

***or number previously paid, if greater; For Reissues, see above*

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	130.00
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

**Reduced by Basic Filing Fee Paid*

SUBTOTAL (3) ($) 130.00

SUBMITTED BY

(Complete *(if applicable)*)

Name *(Print/Type)*	Ying Chen	Registration No. *(Attorney/Agent)*	50,193	Telephone	213-337-6700
Signature				Date	July 9, 2004

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If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

OIPE JC42
JUL 13 2004
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
Yasutomo YAMAMOTO, et al.
Serial No: 10/683,688
Filed: October 9, 2003
For: STORAGE SYSTEM THAT IS CONNECTED TO EXTERNAL STORAGE

Art Unit: 2818
Examiner: To Be Assigned
Confirmation No. 9917

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Commissioner for Patents
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July 9, 2004
Date of Deposit

Name Kimberly Yee 07/09/04
Signature Date

PETITION TO MAKE SPECIAL UNDER MPEP § 708.2, VIII

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I. **Petition**

Applicants hereby petition to make this new application, which has not received any examination by the Examiner, Special.

II. **Claims**

Check and complete all applicable items (a) through (c).

(a) x All the claims in this case are directed to a single invention.

(b) x If the Office determines that all the claims presented are not obviously directed to a single invention, Applicants will make an election without traverse as a prerequisite to the grant of special status.

07/15/2004 BABRAHA1 00000016 501314 10683688
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III. **Search**

A. Check all applicable items (d) though (g)

A search has been made by

(d) _ the inventor

(e) _ attorney

(f) x professional searcher (Search Report attached hereto)

(g) _ foreign Patent Office

in the following:

B. Complete all applicable items below

(h) x field of search:

Class	Subclasses
707	1, 10
709	200, 213, 214, 216

(i) _ publications:

(j) _ foreign patents:

(k) _ search by corresponding foreign Patent Office or at the former International Patent Institute at The Hague, Netherlands

C. Copy of references

There is submitted herewith a copy of the references deemed most closely related to the subject matter encompassed by the claims. These references are also listed in the attached Information Disclosure Statement.

D. Detailed discussion of the references

There is submitted herewith a detailed discussion of the references which discussion particularly points out how the claimed subject matter is distinguishable over the references.

E. Fee

The fee required by 37 CFR 1.17 (h) is to be paid by

x The Commissioner is hereby authorized to charge the Patent Petition fee in the amount of $130.00 to Deposit Account No. 50-1314. If there are any additional fees due in connection with the filing of this Petition to Make Special, please also charge those fees to our Deposit Account No. 50-1314.

Respectfully submitted,

HOGAN & HARTSON L.L.P.

By: _____

Ying Chen
Registration No. 50,193
Attorneys for Applicants

Date: July 9, 2004

500 South Grand Avenue, Suite 1900
Los Angeles, California 90071
Phone: 213-337-6700
Fax: 213-337-6701

DETAILED DISCUSSION OF THE REFERENCES AND COMPARISON TO THE PRESENT INVENTION

IV. Field of the Invention:

The subject matter of the above-identified application relates to storage systems that use a cluster structure.

V. Related Background Art:

A cluster storage subsystem including a plurality of relatively small scale storage nodes that are mutually connected through connection systems such as switches is a conventional system used to realize a large capacity storage system. Each of the storage nodes includes internal modules such as a host interface, a disk drive, control processors, a memory, a control memory, and a disk cache used to process input/output requests with respect to the storage node. (*See, Application, Page 2, Line 10 - Page 3, Line 4*).

One known method of connecting a plurality of storage systems includes connecting a first storage system to a second storage system and providing a logical device of the first storage system to a host through the second storage system as a logical device of the second storage system. Thus, when the second storage system receives from the host an input/output request to access a logical device, the second storage system judges whether the storage device to be accessed corresponds to a logical device in the first storage system or a physical device within the second storage system and sends the input/output request to the appropriate access destination according to the result of the judgment. (*See, Application, Page 3, Line 22 - Page 4, Line 9*). However, a drawback with the conventional method described above includes consuming the operational capacity of the control processor of the

second storage system when an input/output process for the logical device of the second storage system (which corresponds to an external device of the first storage system) is executed by the control processor of the second storage system. (*See, Application, Page 4, Line 21 – Page 5, Line 2*).

VI. The References:

A. The Ofek et al. Reference:

U.S. Patent No. 6,356,977 to Ofek et al. (hereinafter "Ofek") discloses a system and method for on-line, real-time data migration. According to the system disclosed in Ofek, a second data storage subsystem 16 is connected to a host computer 12 using a data communication path 28, and is also connected to a first data storage system 14 using data communication paths 20a, 20b. Data input/output requests from the host computer 12 are received by the second data storage system 16. The second data storage system 16 uses a data map/table 24 to determine whether the requested data is located locally or on the first data storage system 14. The map/table 24 is established during the set-up or configuration of the second data storage system 16 and is dependent of the particular configuration of the second data storage system 16. The second data storage system 16 is coupled to a data storage system configuration device 26 such as a computer, which allows a user to configure the second data storage system 16 and the data map/table 24 as desired by the user. (*See, Ofek, Figure 1 and Column 5, Lines 3 – 21*).

If the requested data is not stored locally, the second data storage system 16 issues a read data request to the first data storage system 14. The first data storage system 14 returns the requested data to the second storage system 16, which then provides the data to the host 12. (*See, Ofek, Column 5, Line 22 – Column 6, Line 51*).

B. The Okumoto et al. Reference:

U.S. Patent Application Publication No. 2003/0204683 to Okumoto et al. (hereinafter "Okumoto") discloses a method, system, and storage controller for controlling shared memories. According to the system disclosed in Okumoto, disk array devices 50, having storage controllers 51, are provided with input/output interfaces for connecting with a host device 20. Each storage controller 51 is provided with a cache memory 52, shared memory 53, and storage devices 56. Shared memories 53 of the storage controllers 51 are connected to a switching device 40 which is part of a network 70. An input/output request from the host device 20, in the form of a small computer system interface (SCSI) packet 60, is provided with a header section 61, which indicates the source or destination storage controller 51, and a payload section 62. The input/output request is received by one of the disk array devices 50 and the header 61 is examined. If the packet indicates that the request is directed to a storage device managed by another storage controller, a path is established by the switching device 40 to the targeted storage controller and the request is executed through that path. (*See, Okumoto, Paragraphs 17-24*).

C. The Ohno et al. Reference:

U.S. Patent Application Publication No 2003/0221077 to Ohno et al. (hereinafter "Ohno") discloses a storage control apparatus and a method for controlling a storage system. According to the storage control apparatus disclosed in Ohno, a first storage control apparatus 10 is connected to a host computer 30 via network 50 and also connected to a second storage control apparatus 20 via network 51. The first storage control apparatus receives data input/output requests from the host computer 30 and determines if the requested data resides on first logic volume 11, located within the first storage control apparatus 10, or on second logic volume

21 located within the second storage control apparatus 20. In the event that the targeted data resides on the second logic volume, the first storage control apparatus 10 generates an input/output request, corresponding to the request received from the host computer 30, and transmits this request to the second storage control apparatus 20 over network 51. As seen from the host computer 30, there is no distinction between input/output requests belonging to the first storage control apparatus 10 or the second storage control apparatus 20. (*See, Ohno, Figures 1 and 5B and Paragraphs 71-81 and 101*).

VII. The Present Invention is Patentably Distinguishable Over the Cited References

A. One Embodiment of the Present Invention:

The present invention seeks to address the above drawback of the conventional method and apparatus for connecting a plurality of storage systems in a cluster storage system. According to an embodiment of the present invention, a storage system includes a first control section connected to a computer, a second control section having a storage device and a cache memory, a third control section that is connected to another storage system, and an internal network that connects the first control section, the second control section and the third control section. When the first control section receives from the computer an input/output request to be accessed to a storage device in the other storage system, the first control section selects to transmit the input/output request to the other storage system through a first path defined by the internal network and the third control section or through a second path defined by the internal network, the second control section and the third control section. (*See, Application, Page 5, Line 17 – Page 6, Line 6*).

Alternatively, when the first control section receives from the computer a first input/output request having first identification information indicative of a

storage device to be accessed, the first control section selects one of the second control section and the third control section to which a second input/output request based on the first identification information is sent. (*See, Application, Page 65, Lines 13-17*).

B. Distinction Over the Cited References:

The cited references do not disclose the above features and arrangements of the present invention. In particular, the cited references do not disclose or suggest the claimed features and arrangements of "a second control storage system comprising . . . a third control section that is connected to the first storage system" and "an internal network that connects the first control section, the second control section and the third control section" as recited in each of the independent claims of the present application, namely independent claims 1, 11 and 19. Moreover, each of the cited references also fails to disclose or suggest the claimed arrangements of "a first path defined by the internal network and the third control section" and "a second path defined by the internal network, the second control section and the third control section" as recited in independent claims 11 and 19.

The system and method for on-line, real-time data migration disclosed in Ofek allows for easily replacing a storage device. According to Ofek, a second data storage subsystem 16 is connected to a host computer 12 using a data communication path 28, and is also connected to a first data storage system 14 using data communication paths 20a, 20b. Data input/output requests from the host computer 12 are received by the second data storage system 16. The second data storage system 16 uses a data map/table 24 to determine whether the requested data is located locally or on the first data storage system 14. If the requested data is not stored locally, the second data storage system 16 issues a read data request to the first data storage system 14. The first data storage system 14

returns the requested data to the second storage system 16, which then provides the data to the host 12. (*See, Ofek, Figure 1 and Column 5, Line 3 – Column 6, Line 51*).

Accordingly, Ofek does not disclose or suggest a second control storage system comprising a third control section that is connected to the first storage system and an internal network that connects the first control section, the second control section and the third control section as claimed. The Ofek reference is completely silent with respect to these features and arrangements. Moreover, the Ofek reference also fails to disclose or suggest the claimed arrangements of "a first path defined by the internal network and the third control section" and "a second path defined by the internal network, the second control section and the third control section" as recited in independent claims 11 and 19.

The method, system, and storage controller for controlling shared memories disclosed in Okumoto allows for controlling shared memories in order to permit I/O data exchange among storage controllers. According to the system disclosed in Okumoto, disk array devices 50, having storage controllers 51, are provided with input/output interfaces for connecting with a host device 20. Each storage controller 51 is provided with a cache memory 52, shared memory 53, and storage devices 56. Shared memories 53 of the storage controllers 51 are connected to a switching device 40 which is part of a network 70. An input/output request from the host device 20, in the form of a SCSI packet 60, is provided with a header section 61, which indicates the source or destination storage controller 51, and a payload section 62. The input/output request is received by one of the disk array devices 50 and the header 61 is examined. If the packet indicates that the request is directed to a storage device managed by another storage controller, a path is established by the switching device 40 to the targeted storage controller and the request is executed through that path. (*See, Okumoto, Paragraphs 17-24*).

Okumoto also fails to disclose or suggest a second control storage system comprising a third control section that is connected to the first storage system and an internal network that connects the first control section, the second control section and the third control section as claimed. In Okumoto, a shared memory 53, not a control section is coupled between the first and second disk array devices 50. Switching device 40, which might function as a control section, is provided outside the disk array devices 50 and is not part of these devices. Thus, Okumoto fails to disclose or suggest a third control section included in the second storage system and also fails to disclose or suggest the internal network the connects the first, second and third control sections. Moreover, the Okumoto reference also fails to disclose or suggest the claimed arrangements of "a first path defined by the internal network and the third control section" and "a second path defined by the internal network, the second control section and the third control section" as recited in independent claims 11 and 19.

Finally, the storage control apparatus and method for controlling a storage system disclosed in Ohno allows for the effective use of an old storage control apparatus when introducing a new storage control apparatus to an existing storage system. According to the storage control apparatus disclosed in Ohno, a first storage control apparatus 10 is connected to a host computer 30 via network 50 and also connected to a second storage control apparatus 20 via network 51. The first storage control apparatus receives data input/output requests from the host computer 30 and determines if the requested data resides on first logic volume 11, located within the first storage control apparatus 10, or on second logic volume 21 located within the second storage control apparatus 20. In the event that the targeted data resides on the second logic volume, the first storage control apparatus 10 generates an input/output request, corresponding to the request received from the host computer 30, and transmits this request to the second storage control

apparatus 20 over network 51. As seen from the host computer 30, there is no distinction between input/output requests belonging to the first storage control apparatus 10 or the second storage control apparatus 20. (*See, Ohno, Figures 1 and 5B and Paragraphs 10, 71-81 and 101*).

Likewise, Ohno also fails to disclose the claimed features and arrangements of a second control storage system comprising a third control section that is connected to the first storage system and an internal network that connects the first control section, the second control section and the third control section. In Ohno, element 16 is merely a port, not a control section that interfaces with the networks connecting the host computer and the second storage control apparatus. Thus, Ohno provides no teaching of a third control section included in the second storage system and an internal network that connects the first, second and third control sections. Moreover, the Ohno reference also fails to disclose or suggest the claimed arrangements of "a first path defined by the internal network and the third control section" and "a second path defined by the internal network, the second control section and the third control section" as recited in independent claims 11 and 19.

Since the cited references fail to disclose, teach or suggest the above features and arrangements recited in each of the independent claims, these references cannot be said to anticipate nor render obvious the invention which is the subject matter of these claims.

Accordingly, independent claims 1, 11 and 19 are believed to be in condition for allowance and such allowance is respectfully requested. The remaining claims depend either directly or indirectly from independent claims 1, 11 and 19 and recite additional features of the present invention which are neither disclosed nor fairly suggested by the cited references and are therefore also believed to be in condition for allowance.

VIII. Conclusion

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance and such action is respectfully requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6809 to discuss the steps necessary for placing the application in condition for allowance.